REMARKS

This Amendment is in response to the Official Action of May 20, 2005.

The requirement for restriction between the claims of Group I (claims 1-32) and Group II (claims 33-41) is acknowledged and an affirmation of the election of the claims of Group I, claims 1-32, is hereby made. Claims 33-41 have been cancelled.

Claims 2 and 11 stand rejected under 35 U.S.C. § 112, second paragraph, as allegedly being indefinite. Claim 11 has been amended to obviate this rejection. As to claim 2, the heating is an "electrical resistive heating" in the form of a DC current. Thus, if the current is applied to the heating device, at least part of the current travels directly through the workpiece. The workpiece is heated because of the electrical resistance of the workpiece. However, claim 2 uses the wording "a DC current that at least partially goes through said workpiece." If the workpiece is surrounded by an electrically conductive material, part of the current will, of course, travel through such surrounding material. Reference is made to Goldberger (US 5,348,694), wherein a device to conduct such a heating method is described. Claim 10 has also been amended to correct a typographical error.

Claims 1-19 and 22-32 stands rejected as being unpatentable over Goldberger (U.S. 5,348,694) in view of Yang (U.S. 6,417,126) and Shen (J. Am. Ceram. Soc., Vol. 85, Num 8, pg. 1921-1927). This rejection is traversed.

The official action lists on page 4 the features of claim 1, which are considered to be disclosed by Goldberger and which are not disclosed and therefore novel over Goldberger. This feature analysis of claim 1 by the examiner is essentially correct. However, the conclusion that the remaining features are prima facie obvious in view of Yang and Shen is respectfully disagreed with.

The features of present claim 1 are as follows:

Claim 1

a) The method for the preparation of a cutting tool insert comprising the steps of

b) milling and mixing powders of alumina and silicon carbide whiskers;

c) forming said mixture into a performed workpiece;

d) heating said workpiece at a heating rate of from about 20 to about 60°C per minute to a sintering temperature of between from about 1600 to about 2300°C; and

e) holding said workpiece at said sintering temperature for a holding time of from about 5 to about 6- minutes at a pressure of between 20 to 100 MPa.

Goldberger discloses a method of consolidating particulate material or combinations of such material into shaped products of very low porosity. According to the method disclosed by Goldberger, a preformed workpiece, which may be made of a powdered material, is placed into a bed of electrically conductive, flowable particles, high pressure is applied, and the workpiece is heated by applying an electrical current. Only the above-mentioned features c) and d) of claim 1 of the present application can be considered to be disclosed by Goldberger.

Goldberger discloses the consolidation any kind of workpiece. In contrast thereof, the method of claim 1 of the present application is directed to the preparation of a "cutting tool insert", which is a very specific type of workpiece. There is no hint or evidence in the disclosure of Goldberger or in the remaining prior art that a skilled person would apply the general method of Goldberger, which is disclosed for any type of workpiece, to form a cutting tool insert. It is well known that cutting tool inserts require a very special treatment, and the properties of cutting tool inserts are very sensitive to the preparation methods. Therefore, it was not obvious for the skilled person to apply a method, which is described for the preparation of any type of workpiece, to such sensitive workpiece like a cutting tool insert. Feature a) of claim 1 should therefore not be considered to be disclosed by Goldberger.

The materials of which the workpieces of Goldberger are prepared are disclosed in column 6, lines 56-58. Accordingly, the particular workpiece may comprise silicon carbide, boron carbide and/or combinations of other carbides and/or in conjunction with metals. Thus, Goldberger does not disclose any of the components used for the preparation of the workpiece of the present invention. Goldberger does neither disclose alumina. Nor does Goldberger disclose silicon carbide whiskers, only silicon carbide powders. If silicon carbide is mentioned by Goldberger, it is always meant to be a powder, but not in the form of

whiskers. It is well known in the art that whiskers are very special in respect of their properties and require thorough handling. When whiskers are used to prepare cutting tool inserts, the properties of such cutting tool inserts greatly depend on the preparation method. Such preparation method parameters are claimed in claim 1 of the present application, but they are not disclosed by Goldberger. Thus, feature b) of claim 1 of the present application is not disclosed by Goldberger.

Further, Goldberger does not disclose a holding time at the sintering temperature of from about 5 to about 60 minutes at a pressure of between 20 to 100 MPa. The contrary is true. Goldberger rather teaches away from these parameters. According to Goldberger, Example II, column 9, lines 25-26), the holding time is 30 seconds, and according to Example III (column 9, line 42), the holding time is 1 minute. There is no further disclosure of holding times in Goldberger. Further, Goldberger states in connection with the prior art discussion in column 3, lines 38-44, that, from the standpoint of minimizing grain growth, rapid heating and limiting the holding time at temperature to no longer than several minutes, and, possibly to residence times of no more than several seconds. Goldberger discusses that conventional sintering furnaces are simply not suited for such conditions. Because his method and device of allow for such short holding times, Goldberger teaches away from longer holding times, and it clearly teaches away from holding times from about 5 to about 60 minutes.

Further, according to Goldberger, Examples II and III, compaction pressures of 1000 psi are applied. According to column 7, lines 29-32, a compaction pressure of approximately 1000 psi may be utilized, but greater pressures (such as 2000 psi) are also beneficially used in other embodiments. Thus, Goldberger discloses 1000 psi to be the most preferred compaction pressure, whereas 2000 psi may also be used. 1000 psi corresponds to 6.9 MPa, and 20000 psi corresponds to 13.8 MPa. These pressures recommended by Goldberger are still far below the pressure range of 20 to 100 MPa claimed by the present invention. Thus, Goldberger does also not disclose feature e) of claim 1 of the present application.

The deficiencies of Goldberger are not supplied by the secondary references.

Yang discloses the preparation of alumina matrix, carbide and boride reinforced ceramic composites. In respect of feature b), the examiner refers to Yang, column 2, lines

61-64. However, this passage only discloses a preform made from a mixture of an alumina and a metal carbide powder and boride powder. Even though Yang also discloses the use of silicon carbide among other metal carbides, Yang does not disclose whiskers of silicon carbide which are particular materials requiring special attention. Thus, feature b) of claim 1 of the present application is not rendered obvious by Yang.

Further, Yang discloses a completely different method and apparatus for conducting his method. Considering Figures 1-6 and the corresponding description of the apparatus by Yang, it is clear that the method and the apparatus by Yang would never be useful to conduct the method of the present invention. Referring to Yang, column 3 lines 47-53, and column 10, lines 54-59, the heating rates applied by Yang are much lower than in the present invention. It should be clear that Yang discloses a conventional sintering method with a slow heating ramp, as it is conducted in conventional sintering furnaces.

Further, Yang does also not disclose sintering under increased pressure, but rather sintering at ambient pressure. Thus, Yang does not disclose the application of high pressures of 20 to 100 MPa, as it is claimed in the present invention. Considering the apparatus used by Yang, the method of Yang would not achieve such high pressures.

Thus, Yang clearly teaches away from the present invention. It would not be obvious for the skilled person to combine the method of Yang with the method of Goldberger. Even if one did consider combination of Goldberger and Yang to be obvious, one would still not end up with the method of the present invention. Picking single features or parameters from the disclosure of Yang, and applying them to the disclosure of Goldberger would not all be obvious, because both references teach in completely different directions. It should also be acknowledged that obviousness considerations do not allow the picking of single parameters from one prior art document to apply them to another prior art document without any evidence that the skilled person would have a good reason to select these particular parameters and combine them with another reference. This applies particularly to the alleged combination of the Goldberger and Yang references, because these two references teach away from each other. There is, on the one hand, the method of Goldberger applying a high heating rate, short holding times and high sintering pressure, whereas Yang discloses the opposite, namely low heating rates, longer holding times and ambient pressure for the sintering process.

Shen discloses a completely different method than Goldberger and Yang, namely spark plasma sintering (SPS). The apparatus used by Shen (page 1921, Figure 1) only on the first sight appears to be similar to that of Goldberger (Figure 1). In fact, the apparatus of Shen is a usual SPS apparatus which does not use a bed material of electrically conductive, flowable particles within the heating zone. It is well known that SPS is a very different method, therefore, it was already not obvious to combine the disclosure of Shen with the disclosures of Goldberger and/or Yang. The SPS method of Shen uses spark plasma heating, whereas the method of Goldberger uses resistive heating, and the method of Yang uses a conventional sintering furnace.

There are further differences in the disclosure by Shen, which teach in a different direction than the present invention and also than Goldberger and Yang.

According to the present invention, a heating rate of from about 20 to about 60°C per minute to a sintering temperature of between from about 1600 to about 2300°C is claimed. Further, according to the present invention, a holding time of from about 5 to about 60 minutes at a pressure of between 20 to about 100 MPa is claimed. Shen teaches completely different parameters. Reference is made to Shen, page 1922 "(3) sintering parameters." Accordingly, Shen discloses a heating rate of 150 to 200°C per minute, which is far above the claimed maximum heating rate of 60°C per minute of the present invention. Further, according to the present invention, a holding time of from about 5 to about 60 minutes at a pressure of between 20 to 100 MPa is claimed. Shen teaches completely different parameters. Reference is made to Shen, page 1922, "(3) sintering parameters." Further, under "sintering temperature," it is stated by Shen that the temperatures were sintered in the temperature interval of 1175 to 1600°C. In the examples by Shen the sintering temperatures are even lower, namely 1200°C or 1300°C. Thus, Shen does not disclose the high sintering temperatures of from about 1600 to about 2300°C of the present invention.

Further, Shen recommends sintering pressure above 100 MPa, namely 200 MPa to achieve the best results. These sintering pressures are far above the claimed sintering pressures of the present invention.

The official action refers to Shen, page 1923, Figure 4 for the time and pressure effect. Considering Figure 4 and paragraph "(3) pressure effect", it become clear that Shen teaches completely different parameters than the present invention. It is the target of Shen to minimize the grain-growth rate and grain size to achieve fully dense compacts by the described method. Table II and figure 4 on page 1923 describe the effect of sintering temperature and holding time, and the paragraph "(3) pressure effect" further describe the effect of the sintering pressure. According to Table II and Figure 4, lower sintering temperatures and lower holding times must be used to achieve low grain sizes and low grain-growth rates. In this respect, a sintering temperature of 1200°C is much better than a temperature of 1300°C. Consequently, sintering temperatures of 1600°C and above, as claimed by the present invention, should be avoided. In this respect, Shen teaches away from the present invention. Further, Shen teaches that pressures as high as 200 MPa achieve the best results in respect of density.

The obviousness considerations and the assumed combination of the references by Goldberger, Yang and Shen in respect of claim 1 of the present invention, as outlined in the Official Action, are not justified and may only be based on a retrospective view onto the present invention. In the Official Action, patentability differences between claim 1 of the present application and the Goldberger reference was the starting point, and then single features and parameter were chosen from Yang and Shen references, even though these documents teach different methods and teach in different directions. There are no indications in the references by Yang and Shen promising any beneficial effect by picking just the parameters selected by the Examiner, and to combine them with the teaching of Goldberger. As outlined above, even a combination of these documents would not lead the skilled person in an obvious manner to the present invention, because not all of the claimed parameters are discloses. Further, none of the references by Goldberger, Yang and Shen discloses preparation of a cutting tool insert. Therefore, the rejection of claims 1-19 and 22-32 of the present application should be withdrawn.

Claims 20 and 21 stand rejected under 35 USC § 103(a) as being unpatentable over Goldberger in view of Yang and Shen and further in view of Brandt (U.S. 5,418,197)). This rejection is also traversed. The deficiencies of the Goldberger, Yang and Shen references as well as their non-combinability are discussed above. While Brandt discloses an Al_2O_3 matrix

containing 5-50% by volume SiC whisker and 1-20% by volume of nanosize metal carbides and/or nitrides and/or borides, Brandt does not satisfy those deficiencies. Withdrawal of this ground of rejection is requested.

Early allowance of claims 1-32 is earnestly solicited.

Respectfully submitted,
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